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EXAMINER	
JEAN BART, RALPH	
ART UNIT	**PAPER NUMBER**
2613	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/728,247	Applicant(s) TAYLOR, MICHAEL GEORGE	
	Examiner Ralph Jean-Bart	Art Unit 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-46 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 6-11 and 33-36 is/are allowed.

6)☐ Claim(s) 1-5,12-15,17-19,26-31 and 37-45 is/are rejected.

7)☐ Claim(s) 3,16,20-25,32 and 46 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 9/27/2004.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Naito et al (US 4,965,858).

3. With respect to claims 1 and 30, Naito teaches a coherent optical detection system receiving an incoming optical signal in an optical communications network (see abstract), a local oscillator emitting light (see figure 19 element LO 7); a phase diverse hybrid for generating two replicas of the incoming signal and two replicas of the local oscillator light (see figure 19 element mixing circuit 8), said phase diverse hybrid combining the first replica of the incoming optical signal and the first replica of the local oscillator light into a first output (see figure 19 element mixing circuit 8) and combining the second replica of the incoming optical signal and the second replica of the local oscillator

light into a second output (see figure 19 element mixing circuit 8) and wherein said local oscillator does not have to be phase locked to the incoming optical signal(it should be noted since the frequency difference between the local oscillator and the incoming signal is not zero, and also applicant discloses on page 7 paragraph 0018 lines 6-8, one of the advantage for heterodyne detection is that the local oscillator does not need to be phase locked, Naito's reference teaching an heterodyne receiver, see column 1 lines 5-10), wherein the phase relationship between the optical signal and the local oscillator light in the first output is different from 0 degrees and different from 180 degrees compared to the phase relationship between the local oscillator light and the optical signal in the second output (see column 19 lines 36-42); and two photo detectors communicating with the phase diverse hybrid, wherein said two photo detectors receive optical signals from the two outputs and convert them to electrical signals (see figure 19 elements photo-electric converter 21P and 21S); whereby the electrical signals are processed to provide a complex representation of the envelope of the electric field of the incoming optical signal (see figure 19 complex envelop discriminator circuit 10; see also equation 1 and 2 from column 4).

4. Claims 13,19, 38, and 41 are rejected under 35 U.S.C. 102(e) as being anticipated by Pering et al (Pub. No.: US 2003/0063285).

5. With respect to claims 13 and 38, Pering teaches a coherent optical detection system receiving an incoming optical signal in a fiber optics network (see paragraph 0045 lines 1-7), a local oscillator emitting light (see figure 1

element 105); an optical mixing hybrid for combining the incoming optical signal and the local oscillator light into at least one output (see figure 1 element coupler 110, output signal 418; paragraph 0049); a photo detector communicating with the optical mixing hybrid (see figure 1 detector 130), wherein said photo detector receives an optical signal from the output and converts it to an electrical signal (paragraph 0004 lines 7-9); an A/D converter to receive the electrical signal from said photo detector (see figure 1 element 134) , said A/D converter digitizing the electrical signal (paragraph 0004 lines 14-17); and a digital signal processor for performing computations on digital values from the A/D converter (see figure 1 element 116), the digital signal processor producing an output which is the result of a signal processing operation on a plurality of samples over time of the complex envelope of the electric field of the incoming optical signal (see figure 2 which is generated different samples such as S1 to Sn, and the waveform of figure 2, the examiner is interpreting this envelope as a complex envelope).

6. With respect to claims 19 and 41, Pering teaches the step of performing computations by a digital signal processor includes performing an optical filtering function on the complex envelope of the electric field (see figure 4 signal conditioning 432, paragraph 0054, the examiner is interpreting that the signal conditioning is capable of performing filtering function).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 26 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pering et al (Pub. No.: US 2003/0063285) in view of Fishman (US 6,607,311).

9. With respect to claims 26 and 42, most of the limitations of these claims have been discussed in claims 13 and 38 above. Pering fails to teach a plurality of wave division multiplexed (WDM) channels that takes into account the other WDM channels and subtracts crosstalk imposed on the first WDM channel by at least one of the remainder of the plurality of WDM channels.

However, Fishman teaches a plurality of wave division multiplexed (WDM) channels that takes into account the other WDM channels and subtracts crosstalk imposed on the first WDM channel by at least one of the remainder of the plurality of WDM channels (see figure 2 elements, MUX 40, transmitter channels 30 incorporate with sources S1-Sn and modulators M1-Mn; column 7 lines 35-48).

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to

have modified the Heterodyne Based Optical Spectrum Analysis of Pering by incorporating a plurality of wave division multiplexed (WDM) channels that takes into account the other WDM channels in order to minimize the fiber loss and subtracts crosstalk imposed on the first WDM channel by at least one of the remainder of the plurality of WDM channels in order to reduce the effect of chromatic dispersion.

10. The motivation for this modification is to provide a method of calculation that reduces the Kerr effect induces by optical pulses propagation in adjacent WDM channels, and, further, to minimize the fiber minimum chromatic dispersion requires in order to reduce the coherence length between electromagnetic fields of different frequencies as taught by Fishman (see Fishman column 1 lines 46-59).

With respect to claim 27, Fishman teaches the crosstalk arises because the optical spectrum of the first WDM channels is partially overlapped over the optical spectrum of a second WDM channel of the incoming optical signal (By definition, the cross-talk is often a measure of the optical power picked by an optical fiber from an adjacent energized fiber; therefore it is inherent that cross talk arises because of optical spectrum of first and second WDM channels).

11. With respect to claims 28 and 43, all the limitations of these claims have been discussed in claims 26 and 42 above. Pering fails to teach the crosstalk is cross phase modulation imposed on the first WDM channel by a second WDM channel during passage through an optical fiber transmission system.

However, Fishman teaches the crosstalk is cross phase modulation imposed on the first WDM channel by a second WDM channel during passage through an optical fiber transmission system (see column 1 lines 38-46).

13. With respect to claim 29 and 44, all the limitations of these have been discussed in claims 26 and 42 above. Pering fails to teach the crosstalk is caused by four wave mixing occurring when the plurality of WDM channels generates a four wave mixing product which at least partially overlaps the optical spectrum of the WDM channel that experiences the crosstalk.

However, Fishman teaches the crosstalk is caused by four wave mixing occurring when the plurality of WDM channels generates a four wave mixing product which at least partially overlaps the optical spectrum of the WDM channel that experiences the crosstalk (column 1 lines 38-52).

12. Claims 14, 15,18, 19, 21,40,41,39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pering et al (pub. No.: US2003/0063285) in view of Agazzi et al (pub. No.: US 2002/0012152).

13. With respect to claims 14 and 39, all the limitations of these claims have been discussed in claims 13 and 38 above. Pering fails to teach the step of performing computations by a digital signal processor includes reversing at least partially the effect of propagation of the signal through an optical fiber transmission system.

However, Agazzi teaches the step of performing computations by a digital signal processor includes reversing at least partially the effect of propagation of

the signal through an optical fiber (it should be noted that paragraph 0011 states the DSP is implemented with parallel path that operates with lower rates than the received data signal, therefore the examiner is interpreting that the DSP is performing the similar operation for reversing the effect of propagation of the signal through an optical transmission medium).

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to have modified the Heterodyne based optical spectrum of Pering by incorporating a digital signal processor includes reversing at least partially the effect of propagation of the signal through an optical fiber in order to facilitate higher rate of data transmission as taught by Agazii (see Agazii paragraph 0008).

14. With respect to claim s 18 and 40, all the limitations of these claims have been discussed in claims 13 and 38 above. Pering fails to teach the step of performing computations by a digital signal processor includes reversing at least partially the effect of multipath interference imposed on the incoming optical signal.

However, Agazii teaches the step of performing computations by a digital signal processor includes reversing at least partially the effect of multipath interference imposed on the incoming optical signal (see paragraph 0008 and abstract)

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to

have modified the Heterodyne based optical spectrum of Pering by incorporating a digital signal processor includes reversing at least partially the effect of multipath interference imposed on the incoming optical signal in order to compensate for intersymbol interference and, further, to facilitate higher rate of data transmissions as taught by Agazii (see Agazii paragraph 0008).

15. With respect to claim 15, most of the limitations of this claim have been discussed in claim 13 above. Pering fails to teach the digital signal processor compensates for the chromatic dispersion of the optical fiber transmission system.

However, Agazii teaches teach the digital signal processor compensates for the chromatic dispersion of the optical fiber transmission system (see figure 1A element 110; paragraph 0021).

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to have modified the Heterodyne based optical spectrum of Pering by incorporating a digital signal processor compensates for the chromatic dispersion of the optical fiber transmission system in order to facilitate higher rate of data transmissions as taught by Agazii (see Agazii paragraph 00080).

16. With respect to claim 21, most of the limitations of this claim have been discussed in claim 14 above. Pering fails to the signal processing operation that

improves the quality of the recovered signal is a feed forward equalization-decision feedback equalization function.

However, Agazii teaches the signal processing operation that improves the quality of the recovered signal is a feed forward equalization-decision feedback equalization function (see figure 12 elements 1208 and 1210).

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to have modified the Heterodyne based optical spectrum of Pering by incorporating a signal processing operation that improves the quality of the recovered signal is a feed forward equalization-decision feedback equalization function in order to eliminate external modulation by using a laser with traditional intensity modulation and, further to reduce the cost of the optical communication system as taught by Agazii (see Agazii paragraph 0024 lines 10-14).

17. Claims 2, 4,5,31 are rejected under 35 U.S.C. 103(a) as being unpatentable by Naito et al (US 4,965,858) in view of Agazii (pub. No.: US 2002/0012152).

18. With respect to claims 2 and 31, most of the limitations of these claims have been discussed in claim 1 and 30 above. This is well known in the art to use an A/D converter in order to change the incoming signal from one form to another. Naito fails to teach the electrical signals received by the two photo detectors are digitized by two A/D converters; and a digital signal processor

performs a computation on digital values from the A/D converters to provide a complex representation or component thereof of the incoming optical signal.

However, Agazii teaches the electrical signals received by the two photo detectors are digitized by two A/D converters (see figure 1B element ADC 108); and a digital signal processor performs a computation on digital values from the A/D converters a component thereof of the incoming optical signal (see figure 1 DSP element 110).

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to have modified the Polarization Diversity Optical receiver of Naito by incorporating two photo detectors that are digitized by two A/D converters in order to increase the speed of the communication system, and, further, a digital signal processor performs a computation on digital values from the A/D converters a component thereof of the incoming optical signal in other to facilitate further measurement or calculation in the communication system.

19. With respect to claim 4, most of the limitations of this claim have been discussed in claim 2 above. Naito fails to teach the digital signal processor produces an output, which is the result of a signal processing operation on a plurality of samples over time of the complex envelope of the electric field of the incoming optical signal.

However, Agazii teaches digital signal processor produces an output which is the result of a signal processing operation on a plurality of samples over

time of the complex envelope of the electric field of the incoming optical signal (it should be noted that figure 1B shows that an optical data signal 102 passes to an optoelectrical converter 114 and goes to an ADC and the DSP is processed the signal and output a digital signal which is the result of the complex envelope of the electric field).

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to have modified the Polarization Diversity Optical receiver of Naito by incorporating a digital signal processor produces an output which is the result of a signal processing operation on a plurality of samples over time of the complex envelope of the electric field of the incoming optical signal in order to provide calculation of the optical system.

20. With respect to claim 5, most of the limitations of this claim have been discussed in claim 1 above. Naito fails to teach the digital signal processor compensates for the chromatic dispersion experienced by the incoming optical signal.

However, Agazii teaches the digital signal processor compensates for the chromatic dispersion experienced by the incoming optical signal (it should be noted that paragraph 0021 discloses in an embodiment of the invention is that the present invention is utilized to perform for chromatic dispersion in optical fiber which the examiner is interpreting that the DSP is compensated for chromatic dispersion in the incoming signals).

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to have modified the Polarization Diversity Optical receiver of Naito by incorporating a digital signal processor compensates for the chromatic dispersion of the optical fiber transmission system in order to facilitate higher rate of data transmissions as taught by Agazii (see Agazii paragraph 00080).

With respect to claims 12,and 45, Naito teaches a local oscillator (see figure 8 element 7), the local oscillator emits light (see abstract); an optical mixing hybrid/ polarization diversity hybrid for generating at least two replicas of the incoming optical signal and two replicas of light from the local oscillator (see figure 8 optical mixing circuit element 8), said optical mixing hybrid combining the incoming optical signal and the local oscillator light into at least two outputs (see figure 8 element mixing circuit 8) and wherein said local oscillators do not have to be phase locked to the incoming optical signal (it should be noted since the frequency difference between the local oscillator and the incoming signal is not zero, and also applicant discloses on page 7 paragraph 0018 lines 6-8, one of the advantage for heterodyne detection is that the local oscillator does not need to be phase locked, Naito's reference teaching an heterodyne receiver, see column 1 lines 5-10, therefore, the local oscillator and the incoming signal are not phase locked); a first output of the two outputs having a first replica of the optical signal and a first replica of light from the local oscillator(see figure 8 element 20, wherein the output of the signal is combined with the output of the local oscillator

to produce one output), wherein the state of polarization of the optical signal and the light emitted from the first local oscillator have a defined relationship (it should be noted that mixing circuit element 8 is used for mixing the two polarized components of the signal light Psi transmitted through the optical fiber 5 and the examiner is interpreting this as a defined relation, see column 7 lines 63-67 ; a second output of the two outputs having a second replica of the optical signal and a first replica of light from the local oscillator, wherein the state of polarization of the light from the second local oscillator with respect to the optical signal is close to orthogonal compared to the first output (see figure 8 element couple 20, since coupler 20 is maintaining the polarization state, therefore the optical signal is closed to orthogonal compared to the first output).

Naito fails to teach two local oscillators, each local oscillator emitting light; an optical mixing hybrid for generating at least four replicas of the incoming optical signal and two replicas of light from each of the local oscillators, said optical mixing hybrid combining the incoming optical signal and the local oscillator light into at least four outputs and wherein said local oscillators do not have to be phase locked to the incoming optical signal; a first output of the four outputs having a first replica of the optical signal and a first replica of light from the first local oscillator of the two local oscillators, wherein the state of polarization of the optical signal and the light emitted from the first local oscillator have a defined relationship; a second output of the four outputs having a second replica of the optical signal and a first replica of light from the second local oscillator of the two local oscillators, wherein the state of polarization of the light

from the second local oscillator with respect to the optical signal is close to orthogonal compared to the first output.

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to have modified the Polarization Diversity Optical receiver of Naito by incorporating at least four replica of the incoming signal and the oscillator light into at least four output. Therefore, it is a matter of design choice.

In addition, Naito teaches at least two photo detectors communicating with the optical mixing hybrid (see figure 8 element light electricity converter 21P and 21S, wherein said two photo detectors receive optical signals from the two outputs (it is inherent that elements 21P and 21S are received optical light, since these two elements are capable for converting light to electricity). This is well known in the art to use an A/D converter in order to change the incoming signal from one form to another. Naito fails to teach at least two A/D converters to receive electrical signals from the two photo detectors, said two A/D converters digitizing the electrical signals; and a digital signal processor for performing computations on digital values from the two A/D converters to obtain information carried by the incoming optical signal.

However, Agazii teaches the electrical signals received by the two photo detectors are digitized by two A/D converters (see figure 1B element ADC 108); and a digital signal processor performs a computation on digital values from the A/D converters a component thereof of the incoming optical signal (see figure 1 DSP element 110).

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains to have modified the Polarization Diversity Optical receiver of Naito by incorporating two photo detectors that are digitized by two A/D converters in order to increase the speed of the communication system, and, further, a digital signal processor performs a computation on digital values from the A/D converters a component thereof of the incoming optical signal in other to facilitate further measurement or calculation in the communication system.

Statement of Reasons for Allowance

Examiner Statement of Reason for Allowance.

Claims 6-11, 33-36 are allowed.

Claims 6-11, 33-36 are allowed because the prior art of record fails to teach four outputs of the at least four outputs of the optical mixing hybrid can be selected such that the Jones vector of the optical signal relative to the local oscillator light at each of the four selected outputs is distinct from the Jones vector of the optical signal relative to the local oscillator light at the other three of the selected outputs.

Objection

Claim 3,16,20-25,32, 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ralph Jean-Bart whose telephone number is (571)270-1017. The examiner can normally be reached on Mon-Thurs 7:30-5:00PM; Fri 7:30-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RSB
Ralph Jean-Bart

11/07/2006

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SUPERVISORY PATENT EXAMINER